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MEMORANDUM

THE TREATMENT OF SAWDUST INSULATION FOR PROTECTION AGAINST DECAY, INSECTS, ANIMALS AND FIRE

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UNITED STATES DEPARTMENT OF AGRICULTURE
U. S. FOREST SERVICE
FOREST PRODUCTS LABORATORY
Madison, Wisconsin

In Cooperation with the University of Wisconsin

MEMORANDUM

THE TREATMENT OF SAWDUST INSULATION FOR PROTECTION AGAINST
DECAY, INSECTS, ANIMALS, AND FIRE¹

NOT FOR PUBLICATION

Dry sawdust or planer shavings properly packed in the walls and attics of buildings afford excellent heat insulation. They have long been used for the purpose although apparently not very extensively. The Forest Products Laboratory is frequently asked by prospective users of such insulation to suggest methods of treatment to prevent it being used as a nesting place for rats, mice, and insects, or to increase its resistance to decay or fire. So far as known, no experiments have been published to supply the answers to the questions about rodents and insects but a few experiments on the effectiveness of fire-retarding chemicals in sawdust have been reported².

From a consideration of the character of the insulation and the habits of mice, rats, and insects, it seems improbable that a wall packed with either sawdust or planer shavings would prove more attractive than hollow walls to any of these pests, but it is known that they will nest in insulated walls if other conditions are favorable. Although termites could build their runways through insulated walls and use the sawdust and shavings for food if they so desired, they probably prefer solid wood. The presence of the insulation in the walls should be of no advantage to them. Similarly it does not seem probable that sawdust or shavings in a wall would offer any attraction to bedbugs, cockroaches, silver fish, ants, or other household insects or provide any more favorable conditions for them than are provided by hollow walls. For these reasons it is believed that sawdust or planer shavings need no treatment for protection against insects and vermin. If the walls of a building remain damp for any considerable period of time they may decay and if they remain dry they will not decay, whether or not they are filled with sawdust.

¹This memorandum is not for publication. It has been prepared in order to answer the numerous requests of correspondents for information about the subjects discussed. It is subject to revision from time to time as new information is obtained.

²"Decreasing the Combustibility of Sawdust," by Joseph L. McCarthy, Ind. and Eng. Chem., Vol. 32, p. 1494-96, (Nov. 1940).

Condensation may develop in walls during cold weather and the more efficient the insulation the more likely condensation is to occur. Most building materials, such as plaster, wood, brick, and concrete, are permeable to vapor. Condensation takes place when outside temperatures are below the dewpoint of the inside atmosphere and the moisture passing as vapor through the plaster and insulation reaches some surface that is below the dewpoint. The same principles of vapor movement apply to unventilated attics. The relative humidity in a house of normal occupancy and without air conditioning will average about 20 percent when the outside temperature is zero. The dewpoint for 70° F. and 20 percent humidity is 28° F., and laboratory tests on insulated walls show that the inside face of the sheathing will be considerably below 28° during periods of zero weather and possibly even with temperatures as high as 15° above. Conditions are then favorable for condensation. Obviously, the higher the inside humidity the higher the dewpoint temperature, and the greater the amount of water that will condense in the wall in cold weather.

Attics can usually be protected against condensation by ample ventilation. Protection against condensation in side walls is obtained by increasing the resistance of inner wall surfaces to vapor transmission. For new houses, the use of asphalt-coated sheathing paper applied over the inside face of the studs before plastering is recommended. For buildings already constructed, suitable paint coatings on the plaster or interior finish should give ample protection for most cases. Aluminum paint followed by other finishing paints gives excellent protection over plaster. Primer and sealer paints also make good base coats. Glue size, kalsomine, and cold water paints offer practically no protection. For further details on the subject, see the publication "Condensation Problems in Modern Buildings," which may be obtained from the Forest Products Laboratory upon request.

If a wall containing sawdust or shaving insulation became thoroughly damp it would take a long time for it to dry out, and considerable trouble might result. The insulation should, of course, be thoroughly dry when placed in the walls, the walls should be dry and the construction should be such that they will remain dry. If this can be accomplished no disadvantage from the standpoint of decay should result from the use of untreated sawdust or planer shaving insulation.

A wall properly filled with sawdust or planer shavings is more resistant to flame spread up through the wall space than a similar hollow wall, for the insulation prevents drafts and thus retards the spread of flames. A smouldering fire in a sawdust-filled wall might be difficult to get at and extinguish but this disadvantage should be more than offset by the very slow rate of burning which should allow plenty of time for extinguishing. If one side is burned away from a sawdust-filled wall, of course, loose sawdust will run out.

For the foregoing reasons given, treatment of the insulating material does not seem very important. Nevertheless, it is possible by suitable treatment to increase the resistance of planer shavings and sawdust to fire, decay, and insects. The following treatments are suggested for the benefit of

those who may be willing to undergo the expense and inconvenience of treatment for the additional insurance of satisfactory performance that treatment will provide. It is not known that these treatments will have any effect on rats and mice, but they include chemicals known to be highly effective against decay, insects, and fire.

Treatment A

For Decay and Insects

To each 100 pounds of air-dry sawdust or planer shavings add 3 pounds of sodium fluoride. The addition may be made by spreading the sawdust on a floor, spreading the sodium fluoride over it, and then mixing the two together by repeated shoveling and stirring. A concrete mixer could be used if available. Sodium fluoride is a fine white powder that is poisonous to human and animal life. Care should be taken to avoid breathing or swallowing the dust. Since sodium fluoride resembles sugar, table salt, and baking soda so closely that it may be mistaken for them, it is best not to have any left over after the treating job is done. Dampening the sawdust with water before spreading the fluoride on it should avoid dusting troubles. A still better method of application is to dissolve the sodium fluoride in 12 to 15 gallons of hot water and mix the water with the sawdust.

After the chemical is mixed with the wood, the mixture should be dried very thoroughly before putting it into the walls of a building.

Treatment B

For Fireproofing

With 100 pounds of dry sawdust mix thoroughly (by sprinkling and stirring) a water solution containing 5 pounds of monoammonium phosphate and 5 pounds of borax (about 12 to 15 gallons of water should be sufficient). If insect and decay resistance are desired as well as fireproofing, both Treatment A and Treatment B can be given at the same time, dissolving all the chemicals in the same water.

No specific information as to cost can be given, for labor and chemicals costs vary widely in different localities. Both transportation charges and quantity purchased have an important bearing on the cost of the chemicals. Current wholesale quotations in trade journals (July 1944) for considerable quantities are as follows: sodium fluoride, 3 cents per pound, monoammonium phosphate, 3 to 4-1/2 cents per pound; borax, 3 to 4 cents per pound. Retail prices, which would include shipping costs, might be considerably higher.

Special Treatment Against Rats

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